## ABSTRACT

### LIPID TETRAD INDEX- A NEW RISK CALCULATOR FOR ST- ELEVATION MYOCARDIAL INFARCTION



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**BACKGROUND-**

Cardiovascular disease is the commonest cause of mortality globally, accounting annually for nearly 12 million deaths, with coronary artery disease (CAD) being the major contributor. There is a steady increase in the prevalence of CAD due to rapid changes in demography and lifestyle consequent to economic development.

Conventional risk factors such as hypertension, diabetes mellitus, and smoking are increased in Indians due to urbanization and Western acculturation. Non-conventional factors such as hyperinsulinemia, insulin resistance, and lipoprotein(a) (Lp[a]) are determined by genes, and their high prevalence among Indians probably explains the precocious nature of CAD that typically affects Indians. These multiplicative effects of conventional and emerging risk factors appear to provide an explanation for excess burden of CAD among Indians. The increased concentration of atherogenic lipoproteins plays an important role in the development of atherosclerosis leading to premature myocardial infarction and stroke. Lp(a) is an atherothrombogenic lipoprotein that is inherited as a genetic quantitative trait and Is an important emerging risk factor for premature coronary heart disease (CHD).

Lipoprotein(a) has evolved as a genetically-linked risk factor in thrombosis. High levels of Lp(a) have been identified within the atherosclerotic plaque and may represent an important link between atherogenesis and thrombogenesis. Higher Lp(a) levels are associated with a 2-3-fold risk of CAD which increases exponentially with concomitant presence of low HDL cholesterol, high total cholesterol/HDL cholesterol ratio or high homocysteine; all of which are common among Asian Indians, a race known to bear the burden of premature CAD.

Hence, the present study is on simultaneous measurement of several lipid biomarkers and calculation of lipid tetrad index (LTI). The LTI is derived by multiplying three lipids which are directly associated with CAD and dividing the product by high-density lipoprotein (HDL) which is inversely associated with CAD.

$$\text{Lipid tetrad index} = \frac{\text{Total cholesterol} * \text{Triglycerides} * \text{Lipoprotein (a)}}{\text{High density lipoprotein}}$$

## AIMS AND OBJECTIVES

To compare the serum lipid patterns in “ST Elevation Myocardial Infarction” patients and healthy controls and to establish Lipid Tetrad Index as a promising atherogenic index.

**METHODS:-**

SETTING: Coronary Care Unit , Cardiology Department, Govt. Rajaji Hospital, Madurai Medical College, Madurai.

INCLUSION CRITERIA: Patients admitted with anginal pain and ECG showing ST Elevation MI, Elevated Creatine kinase-MB levels.

EXCLUSION CRITERIA: Patients with/on Diabetes Mellitus, Hypothyroidism, Chronic Renal Failure, Nephrotic Syndrome, Hormone Replacement Therapy, Statins and/or Fibrates.

DESIGN OF STUDY: Observational study.

PERIOD OF STUDY: 6 Months from February 2018 to July 2018.

PARTICIPANTS: 100 ST elevation myocardial infarction patients admitted in Coronary Care Unit, Govt. Rajaji hospital and 100 age and sex-matched healthy subjects. 100 patients admitted in Coronary Care unit with another primary diagnosis are selected based on the inclusion/exclusion criteria &100 normal subjects taken.

METHOD: Fasting venous samples were collected and sent for lipid profile and lipoprotein(a) estimation .Lipid Tetrad Index is calculated using the following formula

$$\text{LTI} = \frac{\text{TOTAL CHOLESTEROL} * \text{TRIGLYCERIDES} * \text{LIPOPROTEIN A}}{\text{HIGH DENSITY LIPOPROTEIN}}$$

**RESULTS :**

- In our study,100 cases and controls were included. Age and sex were matched between cases and control groups, and there was no significant difference between two groups. Sixty percent were males, and 40% were females in both control and study groups.
- The mean HDL ( 36.62 vs 43.69) is lower in study group compared to control group..
- The mean plasma Lp(a) is greater in study group compared to the control group (37.25 vs 18.73mg/dl ) which is statistically significant.
- There is no statistically significant gender difference in the mean plasma Lp(a) and LTI in the control and study groups.
- LTI values in study group are greater compared to control group for their respective age distribution and is statistically significant (24093.53 vs 5582.09).
- There is a highly significant positive correlation between the LTI and Lp(a) levels. There is a negative correlation between LTI and the HDL which is statistically significant.
- The mean plasma TC, TGL, VLDL are greater in study group compared to the control group.
- The effect of various lipid parameters as well as Lp(a) on the atherogenicity is not additive but multiplicative which is well demonstrated by the lipid tetrad index. The mean lipid tetrad index of the patients with CAD was significantly higher than the patients without CAD.

**CONCLUSION** :

This study on evaluation of LTI in ACS shows that it is a promising atherogenic index in risk factor assessment when compared to other lipid parameters. LTI facilitates in early identification of individuals with high risk for premature CAD as a result of their genetic predisposition. Since no well-established Lp(a) lowering drugs are available at present, there is a need to create awareness for early detection and modification of other risk factors in young individuals. Early intervention like lipid lowering drugs helps preventing the progression of atherosclerosis and in reducing the morbidity and mortality from ACS.

Key Words : LTI- Lipid Tetrad Index

STEMI- ST Elevation Myocardial Infarction

Lp(a)-Lipoprotein(a)

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